

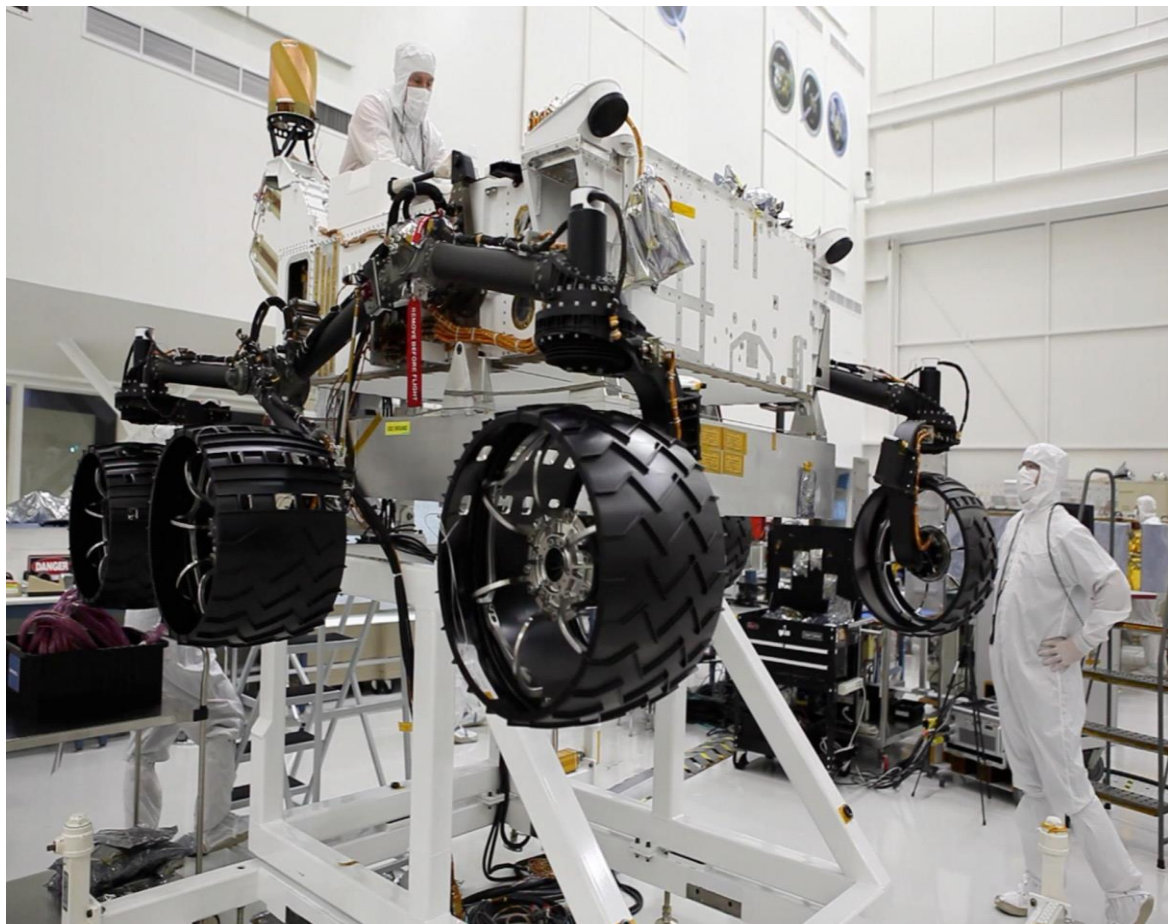
National Aeronautics and Space Administration

Mars Rover Celebration

Curriculum Module

Week 5: Designing and Building

Lesson 13: Construct Mock-Up



Educational Product	
Educators & Students	Grades 3-5

www.marsrover.org

Week 5: Designing and Building

LESSON 13: CONSTRUCT MOCK-UP

GRADE LEVEL: 3-5

LENGTH: 3 DAYS

VOCABULARY: characteristic
ingenuity
manager

MATERIALS:

- Audio file or transcript from [“Engines of our Ingenuity: Scotty”](#)
- Completed rover designs (team chart papers from Lesson 12)
- Science Notebooks
- Found materials for rover construction such as:
 - Paper plates
 - Aluminum foil
 - Colored construction paper
 - Straws
 - Popsicle sticks and/or tongue depressors
 - Pipe cleaners
 - Styrofoam cups
 - Foil tart pans (3" diameter)
 - Foam core board or card board
 - Small card board tubes (toilet paper roll cores, paper towel cores, etc.)
 - Glue
 - Brads
 - Tape
 - Paperclips
 - Staples
 - Poster paint

Optional Materials:

- Solar Rover Kit for each team (or equivalent; not to exceed \$25)
 - Kelvin Solar Racer Kit
 - Kelvin Scientific Economy Solar Racer Kit with Wood Body
 - Kelvin Scientific Economy Solar Racer Kit with Plastic Body
 - Pitsco SunEzoon Solar Car Kit
 - Pitsco SunZoon Lite Solar Car Kit

OR

- Radio Control Kit for each team (or equivalent; not to exceed \$25)
 - Kelvin Scientific R/C Car Solderless Kit
 - Nikko 1:18 Radio Control Hummer H2 Remote Control Car

ESSENTIAL QUESTION:

How does assigning a different job to each member of your team (designer, scientist, project manager, engineer) help you to complete your Mars rover mission?

LESSON OBJECTIVE(S):

Students will be able to:

- Explore the importance of engineering in our society
- Work as a team to build a prototype of the team's rover using student Science Notebooks and team sketches as a guide

ENGAGEMENT

1. At the beginning of this lesson, and using the attached documents, present the Essential Question and Key Vocabulary for students to consider during the lesson.
2. Ask students if they have ever watched a Star Trek movie or episode. Ask:
 - What interesting devices did you see? Are they real?
 - What kind of careers would be involved in developing things like this?
 - Why do these different careers need people with ingenuity to be successful?
3. Read or listen to [“Engines of our Ingenuity: Scotty”](#) (Runtime 3:43)
4. Once students have finished reading or listening, discuss with students the characteristics of a good engineer. Make a list on the board.
5. When finished, solicit responses from students for the characteristics of a:
 - Scientist
 - Designer
 - Project Manager
6. For each of the career assignments, ask students how they will need to show ingenuity in each of these roles when they work with their teams.
7. Once the discussion has concluded, ask students to focus on the characteristics listed under their assigned career as they work to build their rovers.

EXPLORATION

1. Students will work with their teams for the remainder of the class periods to build their prototype rovers.
2. Students may use any reasonable materials (including those that might be brought from home) to complete their rovers.
3. Students may also use any resources for support, or troubleshooting such as:
 - Science Notebooks
 - Computers, Internet
 - Team Chart Papers
 - Other student notes
4. As students work, display the PowerPoint “Building Your Prototype”. This presentation plays on a loop and displays reminders for students as they work.

EXPLANATION

1. At the end of each class period, the teacher is encouraged to bring students back together to briefly discuss successes and challenges.

ELABORATION

1. Students should continue to build their team rovers, focusing on developing fair tests with controlled variables to determine any failure points and improve them in their prototypes.

EVALUATION

1. During this lesson, the teacher is encouraged to use formative assessments to determine and deepen student understanding. Teachers will assess team rovers at the end of the project.
2. Teachers are encouraged to create their own grade-level and ability-level assessments so as to best meet the needs of their students.

SUPPLEMENTAL RESOURCES

Because students should use the entire time to build their rovers, no supplemental resources are provided for this lesson.

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